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ABSTRACT

The purposes of this study were to determine (1) whether there is a developmental sequence in children's acquisition of metalinguistic abilities and (2) whether the acquisition of these abilities is related to Piagetian operations. Word awareness served as the measure of metalinguistic ability. An attempt was also made to determine whether the emergence of word awareness could be shown to follow a theoretically postulate sequence. Items were constructed on the assumption that word awareness proceeds according to predictable principles and included words in an unstructured list, the addition of words to sentences that already form a semantic whole, and the addition of a word which changed the grammatical structure of the sentence. Fifty kindergarten and 50 first grade children were tested on word awareness, seriation tasks, riddles, reading readiness, reading achievement, and IQ. Findings showed a rapid increase in word awareness at about age six and substantiated the theoretically predicted order of difficulty of the item types. Results also corroborated previous findings which showed that neither seriation operations nor metalinguistic abilities appear before age five for most children. Findings suggested that most children acquire linguistic skills prior to cognitive ones. (HOD)

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Metalinguistic Ability and Cognitive Performance in Children from Five to Seven

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The purposes of this study were: (1) to determine whether there is a developmental sequence in the child's acquisition of certain metalinguistic abilities; (2) to determine whether the child's acquisition of these metalinguistic abilities is related to Piagetian operations. The measure of metalinguistic ability on which this study focused was word awareness, or the ability to separate and identify words presented in context.

Theoretical writings of Piaget (1923) and Vygotsky (1962) support the view that the child only gradually develops awareness of words as manipulable units. Vygotsky states, "Semantically, the child starts from the whole, from a meaningful complex, and only later begins to master the separate semantic units, the meanings of words, and to divide his formerly undifferentiated thought into units (p. 126)." Werner and Kaplan (1963) contend that, although a child speaks grammatically, there is a fusion of word meaning with sentence meaning, and a lack of true lexical concepts.

Recent experimental studies (e.g., Braun-LaMesch, 1967; Holden & MacGinitie 1969, 1972; Huttenlocher, 1964; Karpova, 1955) have shown that children under five do have great difficulty in isolating or manipulating words in context, and that older children continue to have difficulties with such word classes as prepositions, articles, and conjunctions.

That the ability to segment language and Piagetian concrete operations develop at about the same age suggests that there may be a connection between the development of word awareness and operational thinking. If this is so, operational levels may exist with respect to language as well as with respect

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to cognitive structures. The child who cannot predict or imagine the effect of physical operations upon objects may also lack the ability to isolate and manipulate the elements of language--to decenter from the semantic aspect of the message and focus on its structural or phonetic aspects.

Procedure

In addition to investigating the relationship between metalinguistic ability, as indexed by word awareness, and cognitive development, this study attempted to determine if the emergence of word awareness could be shown to follow a theoretically postulated sequence.

The earlier word awareness studies have tacitly assumed that young children understand the meaning of the term word although linguists themselves have not been able to give it a satisfactory definition that covers all contexts and languages. To eliminate possible difficulties from this source, each item in the Word Awareness Test, specifically designed for this study, employed two utterances that were identical except for the addition of a word or short phrase in the second utterance. The child's task was to identify the addition to the second utterance.

Three types of items were constructed based on the assumption that word awareness proceeds according to predictable principles. If young children perceive utterances globally, a logical first step in recognizing the segments of language might occur in situations where words were presented in an unstructured list. Thus, an easy item should be read, boy, blue; read, boy, many, blue, where the child has only to identify the inserted word many to achieve success. The addition of words to sentences that already form a semantic whole should result in a more difficult type of item: Jack went swimming; Jack and Bill went swimming. The most difficult

condition was assumed to occur in a situation where the addition of a word changed the grammatical structure of the sentence. Items with these characteristics were constructed around homophone pairs. A typical item would be John leaves after dinner; John raked leaves after dinner. The Word Awareness Test consisted of 30 items similar to the examples given above divided into three subtests: Test I, Lists; Test II, Sentences; and Test III, Homophones. Each subtest contained 10 items.

The subjects were 100 children, 50 from the kindergarten and 50 from the first grade of a suburban public school in northern Virginia. The children were tested on the Word Awareness Test, three Piagetian seriation tasks (simple seriation, seriation with screen, and intercalation; Inhelder and Piaget, 1964), two seriation tasks devised by Almy (1970), a standardized Riddle Interview, a group IQ test (the CAT), and a reading readiness test (for kindergarten Ss) or a reading achievement test (for first grade Ss). Objective scoring systems were established to rate performance on all variables.

The seriation tasks were selected because they involve aspects of serial ordering that are analogous to metalinguistic operations. However, in speech as in seriation, the relationship of the units to each other may not be available to the pre-operational child.

Scores on 29 variables for the first grade and 35 for the kindergarten (including subtests of each instrument) were obtained and means and standard deviations were computed. Three correlation matrices, one for each grade and one for the total sample were also obtained. The correlation matrix for the entire sample was edited to eliminate total scores and readiness and reading test scores that were not comparable for the two grades. The

edited matrix was submitted to a principle components factor analysis with varimax rotation. Analysis of variance was performed to determine if there were significant differences between grade levels and between the three types of word awareness items.

Results

The reliability of the Word Awareness Test as calculated by the analysis of variance method was .93 for kindergarten, .87 for first grade and .95 for the combined groups. For the combined groups, the reliability of Test I, Lists, was .85, of Test II, Sentences, .90, and of Test III, Homophones, .91. A 2 x 3 analysis of variance with repeated measures showed significant differences at the .01 level between grade levels, types of word awareness items, and for the interaction between them. The items in Test I, Lists, were easier than the items in Test II, Sentences, which in turn were easier than the items in Test III, Homophones. (See Table 1.) Short term memory is not likely to be an explanation of these findings. Four of the sentences in Test I, Lists, were jumbled versions of four sentences in Test III, Homophones. The kindergarten Ss performed considerably better on the four items when they were presented under the list condition, whereas the first grade Ss, although outperforming the kindergarten Ss on all eight items, performed better on two items under the list condition and better on two under the sentence condition.

An analysis of variance of scores on the Piagetian seriation tests revealed that the entire battery of three tasks had a reliability, for the entire sample, of .54. Test-retest reliabilities obtained on a similar sample yielded correlations of .56 for seriation with screen and .74 for

intercalation, suggesting that seriation with screen is a rather unstable measure, and intercalation only a moderately stable one. Under these conditions, very high correlations with the Word Awareness Tests were precluded. The correlation for the total group between total scores on the Word Awareness Tests and the Piagetian Seriation tasks was .46. If this correlation is corrected for the unreliability of both scores, it increases to .68. (See Tables 2, 3, and 4 for intercorrelations for kindergarten, first grade, and total group.)

The factor analysis revealed six major factors. (See Table 5.) The word awareness subtests clearly loaded on Factor 1 as did chronological age. Factor 2 was dominated by the subtests of the group intelligence test. Factor 3 represented Piaget's intercalation task and Almy's (1970) seriation tests. Factor 4 was characterized by parental education, and Factor 5 by the Riddle Interview. The last Factor represented primarily the two easier seriation tasks. None of the variables of the study loaded heavily on more than one factor, and no factor received heavy loadings from more than one group of variables, with the notable exception of age and word awareness. However, in this sample age is related to exposure to reading instruction, and the inference that age is a major variable in determining word awareness should be made with this reservation.

Qualitative analysis of the data suggested that identification of the inserted word or phrase is influenced by the abstract-concrete dimension of the inserted word(s), the transformational complexity of the sentence into which it is inserted and the length of that sentence. Thus, concrete words inserted at the beginning of short, simple sentences or lists appeared

to present the least difficulty. Abstract words inserted into the middle of longer more complex sentences were much more difficult.

The relationship between the Word Awareness Test and the Piagetian tasks of seriation was low. The simple seriation task was easy for this sample, and the scores were unreliable. The remaining seriation task scores--seriation with screen, intercalation, and total seriation--and the three Word Awareness Test scores plus total score for Word Awareness yielded a total of 36 correlation coefficients, 12 for kindergarten, 12 for the first grade and 12 for the total sample. All were positive; 23 were significant at the .05 level, and 15 were significant at the .01 level. The highest correlation, however, was only .48. Each child's performances on the Word Awareness Tests and on the Piagetian Seriation Tasks were categorized and entered into a joint distribution table (Table 6). The joint distribution of categorized data was similar to Sinclair's in that language was in advance of operations, and the joint distribution of the two variables had one nearly empty cell; there were very few children who were at the operational level on the seriation tasks who did not make high scores on the Word Awareness Tests, although many children who made high scores on the Word Awareness Tests were not at the operational level on the seriation tasks.

The Riddle Interview, which involved four riddles based on puns or homophones, was assumed to be an additional measure of a child's ability to recognize and hold in awareness multiple aspects of a situation. The correlation between scores on the Riddle Interview and Test III, Homophones, was .60 for the entire sample. The Riddle Interview has a relatively low reliability of .66 when computed by the analysis of variance method. Correcting for the unreliability of the two tasks yields a correlation of .77 for the

entire sample between the Riddle Interview total score and Test III, Homophones, of the Word Awareness Tests. The Riddle Interview was very difficult for most children.

Discussion

The findings show a rapid increase in word awareness at about age six and substantiate the theoretically predicted order of difficulty of the item types. The results also corroborate findings of previous researchers that neither seriation operations nor metalinguistic abilities appear before the age of five for most children. By probing development in both areas within the same subjects, however, evidence was obtained to show that the two variables are rather closely related within a fairly narrow age range. Lenneberg (1971) has recently presented a strong argument against an explanation of first language acquisition that involves making sharp distinctions between items and operations (words and syntax). Within the framework of present-day psycholinguistics, Lenneberg appears to be confirming Werner's observation that the word and the sentence emerge together.

In one respect, the unconscious learning of linguistic regularities in the earliest years may be analogous to the sensory-motor learning of the pre-operational period. Subsequent conceptual learning is based more and more on conscious awareness of laws, rules, or relationships that permit manipulations of abstract concepts. Language acquisition in early childhood may involve reliance on sensory-motor or perceptual strategies (Bever, 1970), while later language learning may reflect the conceptual and cognitive processes associated with operational thinking and the ability to formulate and communicate intuitions about language.

These considerations suggest a new conception of the problem of teaching pre-operational children to read. Although the pre-operational child generates syntactic utterances, it cannot be assumed that he can comprehend the process of analyzing or synthesizing words or utterances as specimens. If these restrictions on young children's metalinguistic ability do exist, then trying to teach pre-operational children to read by decomposing words or sentences, on the assumption that words and the relations between words can then be synthesized, may be analogous to trying to train Piagetian operations. Such training frequently succeeds with the particular materials used in training, but the cognitive operations that generalize to new materials are difficult to establish.

The Word Awareness Tests seem to represent a hierarchical elaboration of a homogeneous underlying attribute. Unfortunately, the Piagetian measures, as used here, were considerably less reliable than the Word Awarenses Tests. Although a continuous scoring system was employed to rate the children's performance on the seriation tests, the scores tended to cluster at two points on the scale. This result accords with Piaget's own view of the discontinuous nature of the underlying ability.

Another possible reason that the actual correlations between the Word Awareness Tests and the Piagetian measure were not higher is that, empirically, no strict sequential order for the acquisition of the various operations has been found. A major question in the literature involves the theoretical basis and the empirical evidence for sequences and concurrences in the attainment of particular operations. Using middle-class American children whose performance was measured on several operations, Almy (1970) found no evidence for an invariant sequence of acquisition. Flavell (1970) has suggested that, with respect to same-stage acquisitions, there is only a loose kind of developmental synchronism.

Both Sinclair's study and the present one tend to support the hypothesis that qualitative changes in linguistic abilities are contemporary with the attainment of operational thinking.

Also in both studies, when the data are categorized and entered into contingency tables, very few children who achieve the level of concrete operations do not also reach an advanced level on the linguistic task, although there are a large number of children who are linguistically advanced, but have not attained the level of concrete operations. This suggests, as nearly as can be determined from cross-sectional studies, that most children acquire the linguistic skills prior to the cognitive ones. On the basis of Sinclair's data (1967) and the findings of the present study, the Genevan position that operations are basic to language requires clarification.

The attempt of the present study to relate operational levels to linguistic performance in children has little precedent other than Sinclair's work. Because of this lack of data, not only is the classification of specific linguistic behaviors as operational or non-operational somewhat arbitrary, the very concept of linguistic stages may be misleading. Different results might have been obtained if either the linguistic variable, the cognitive variable, or both had been selected from different domains.

However, because the Piagetian model has proved useful in investigating children's cognitive development, it may prove useful in investigating relationships between the attainment of operational levels and the attainment of specific linguistic skills. The use or the production of verbal mediators, the appearance of paradigmatic responses on word association tests, and the production and comprehension of certain types of complicated sentences may well be related to the attainment of specific cognitive abilities.

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Table 1

Means and Standard Deviations of the Variables of the Study for Kindergarten, First Grade, and Total Group

Name of Variable	Kindergarten			First Grade			Total Group		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
1. WAT I-Lists[a]	50	13.6	4.0	50	17.0	3.2	100	15.3	4.0
2. WAT II-Sentences	50	11.[illegible]	6.1	50	16.[illegible]	2.4	100	14.2	5.4
3. WAT III-Homophones	50	[illegible].4	[illegible].1	50	14.[illegible]	3.4	100	10.5	[illegible].4
4. WAT Total	50	31.4	14.1	50	48.[illegible]	7.3	100	39.[illegible]	14.1
5. P-Simple Seriation[b]	50	[illegible].3	2.4	50	[illegible].[illegible]	1.3	100	[illegible].5	1.[illegible]
6. P-Seriation with Screen	50	6.2	4.1	50	7.[illegible]	2.9	100	7.0	3.[illegible]
7. P-Intercalation	50	2.[illegible]	4.1	50	4.3	4.3	100	3.5	4.3
[illegible]. P-Total	50	[illegible].3	[illegible].[illegible]	50	21.[illegible]	[illegible].5	100	20.1	[illegible].4
[illegible]. Almy's Test-Monkeys	50	[illegible].[illegible]	1.[illegible]	50	5.1	1.4	100	[illegible].0	1.[illegible]
10. Almy's Test-Balloons	50	[illegible].[illegible]	2.[illegible]	50	[illegible].[illegible]	2.3	100	[illegible].4	2.4
11. Almy's Test-Total	50	[illegible].[illegible]	3.[illegible]	50	11.[illegible]	3.[illegible]	100	10.3	3.[illegible]
12. CAT-Oral Vocabulary[c]	50	[illegible].[illegible]	2.[illegible]	[illegible]	17.2	3.0	[illegible]7	[illegible].[illegible]	3.1
13. CAT-Relational Concepts	50	[illegible].3	2.1	[illegible]7	[illegible].2	1.[illegible]	[illegible]7	[illegible].[illegible]	2.1
14. CAT-Multi-Mental	50	13.[illegible]	1.[illegible]	[illegible]7	13.3	1.6	[illegible]7	13.1	1.[illegible]
[illegible]. CAT-Quantitative	50	11.3	2.3	[illegible]7	12.[illegible]	2.[illegible]	[illegible]7	12.1	2.[illegible]
[illegible]. CAT-Total	50	56.3	[illegible].[illegible]	[illegible]7	[illegible]1.[illegible]	[illegible].[illegible]	[illegible]7	[illegible]8.[illegible]	7.2
[illegible]. CAT-Deviation I.Q.	50	113.[illegible]	13.[illegible]	[illegible]7	10[illegible].0	1[illegible].[illegible]	[illegible]7	110.[illegible]	14.4
[illegible]. Riddle-1	[illegible]8	.[illegible]	.7	[illegible]3	1.1	.[illegible]	[illegible]3	.[illegible]	.[illegible]
[illegible]. Riddle-2	[illegible]0	.	.	[illegible]5	1.1	.[illegible]	[illegible]3	.[illegible]	.[illegible]
20. Riddle-3	[illegible].	.1	.3	42	.[illegible]	.[illegible]	[illegible]0	.2	.[illegible]
21. Riddle-[illegible]	[illegible]8	.[illegible]	.[illegible]	[illegible]3	.[illegible]	.[illegible]	[illegible]1	.[illegible]	.[illegible]
22. Riddle Interview Total	[illegible]8	1.	1.[illegible]	42	3.4	1.[illegible]	[illegible]0	2.[illegible]	1.[illegible]
23. Chronological age in months	50	[illegible]4.[illegible]	[illegible].0	50	[illegible].2	3.[illegible]	100	[illegible].[illegible]	[illegible].[illegible]
[illegible]. Mother's educ. in years	[illegible]9	13.[illegible]	2.3	50	14.1	2.[illegible]	[illegible]9	13.[illegible]	2.[illegible]
[illegible]. Father's educ. in years	[illegible]7	13.1	1.[illegible]	50	12.[illegible]	1.[illegible]	[illegible]7	13.0	1.[illegible]
[illegible]. Total parental education	[illegible]7	[illegible].[illegible]	3.[illegible]	50	[illegible]7.0	3.[illegible]	[illegible]7	[illegible].[illegible]	3.[illegible]

Table 1 (Cont.)

Name of Variable	Kindergarten			First Grade			Total Group		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
27. GM[d]-Listening	50	14.4	3.1						
28. GM-Auditory	50	19.2	1.3						
29. GM-Visual	50	20.3	3.7						
30. GM-Directions	50	12.1	1.5						
31. GM-Letter Recognition	50	16.4	2.5						
32. GM-Coordination	50	13.9	2.9						
33. GM-Blending	50	12.5	1.3						
34. GM-Readiness Total	47	123.2	12.0						
35. GM-Word Recognition	47	13.4	5.5						
36. GM-Reading Vocabulary				43	42.2	9.5			
37. GM-Reading Comprehension				43	25.4	4.3			
38. GM-Total Reading				43	67.6	12.0			

[a] WAT indicates Word Awareness Tests

[b] P indicates Piagetian Seriation Tasks

[c] CAT indicates Cognitive Abilities Test

[d] GM indicates Gates-MacGinitie Readiness Skills or Primary A

Table 2

Intercorrelations for Kindergarten[a]

Name of Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. WAT[b] I-Lists	100	56	45	72	34	28	36	44	32	40	42	58	53	39	00	26	47
2. WAT II-Sentences		100	81	94	35	40	18	41	07	02	02	41	42	47	$\overline{09}$	20	48
3. WAT III-Homophones			100	91	30	40	25	42	14	06	11	39	37	60	$\overline{04}$	14	58
4. WAT-Total				100	38	42	28	48	18	13	17	51	49	58	$\overline{05}$	22	60
5. P[c]- Simple Seriation					100	43	19	33	44	26	39	43	34	21	06	01	16
6. P-Seriation Screen						100	30	81	30	11	22	31	32	34	$\overline{01}$	22	42
7. P-Intercalation							100	74	22	49	43	53	43	25	13	27	59
8. P-Total								100	41	40	46	57	50	37	08	28	61
9. Almy's Test-Monkeys									100	50	81	30	15	34	21	15	25
10. Almy's Test-Balloons										100	91	46	38	19	12	23	30
11. Almy's Tests-Total											100	45	32	29	18	23	32
12. CAT[d]-Total												100	85	42	02	47	60
13. CAT-Deviation I.Q.													100	35	$\overline{45}$	53	40
14. Riddle Interview Total														100	09	29	57
15. Chronological Age															100	$\overline{19}$	26
16. Total Parental Education																100	34
17. GM[e] Readiness Total																	100

[a] Table is to read in hundredths. Overlining indicates negative decimal.

[b] WAT indicates Word Awareness Tests. [c] P indicates Piagetian seriation task. [d] CAT indicates Cognitive Abilities Test. [e] GM indicates Gates-MacGinitie Readiness Skills Test.

Table 3

Intercorrelations for First Grade[a]

Name of Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. WAT[b] I-Lists	100	36	50	73	06	03	19	15	08	19	16	14	25	05	$\overline{12}$	17	27
2. WAT II-Sentences		100	59	76	13	11	20	21	19	20	21	40	43	29	02	23	30
3. WAT III-Homophones			100	88	09	12	30	28	18	32	29	31	37	31	03	09	34
4. WAT-Total				100	11	11	28	26	18	30	28	33	42	26	$\overline{03}$	19	38
5. P[c]-Simple Seriation					100	34	19	48	29	30	31	23	24	04	$\overline{05}$	18	29
6. P-Seriation Screen						100	32	73	02	33	23	23	28	17	$\overline{17}$	17	17
7. P-Intercalation							100	85	42	59	58	45	41	10	23	14	41
8. P-Total								100	34	61	55	45	46	11	07	21	41
9. Almy's Test-Monkeys									100	63	85	56	47	16	27	20	48
10. Almy's Test-Balloons										100	94	53	53	20	01	17	43
11. Almy's Tests-Total											100	60	56	20	12	20	50
12. CAT[d]-Total												100	94	51	20	39	68
13. CAT-Deviation I.Q.													100	55	06	38	66
14. Riddle Interview Total														100	04	29	31
15. Chronological Age															100	$\overline{06}$	10
16. Total Parental Education																100	45
17. GM[e]-Total Reading																	100

[a]Table is to be read in hundredths. Overlinging indicates negative decimal.

[b]WAT indicates Word Awareness Tests. [c]P indicates Piagetian Seriation Task. [d]CAT indicates Cognitive Abilities Test. [e]GM indicates Gates-MacGinitie Reading Test.

Table 4

Intercorrelations for Total Sample[a]

Name of Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. WAT[b] I-Lists	100	60	60	73	28	26	32	39	25	36	35	48	27	36	34	20
2. WAT II-Sentences		100	83	93	33	38	23	41	13	13	15	48	22	51	40	17
3. WAT III-Homophones			100	94	26	38	30	43	18	24	24	48	13	60	53	10
4. WAT-Total				100	32	39	32	46	20	26	27	54	22	57	49	17
5. P[c]-Simple Seriation					100	42	20	58	38	28	36	36	26	18	11	08
6. P-Seriation Screen						100	33	79	21	23	25	33	25	39	14	19
7. P-Intercalation							100	79	32	26	32	32	37	11	24	20
8. P-Total								100	39	31	32	55	40	30	24	24
9. Almy's Test-Monkeys									100	57	83	42	27	26	22	18
10. Almy's Test-Balloons										100	93	52	40	23	20	20
11. Almy's Tests-Total											100	54	39	27	24	21
12. CAT[d]-Total												100	75	53	36	40
13. CAT-Deviation I.Q.													100	27	$\overline{30}$	44
14. Riddle Interview Total														100	38	24
15. Chronological Age															100	$\overline{06}$
16. Total Parental Education																100

[a] Decimal points omitted. Overlining indicates negative correlation.

[b] WAT indicates Word Awareness Tests. [c] P indicates Piagetian Seriation Task. [d] CAT indicates Cognitive Abilities Test.

Table 5

Principal Components Factor Analysis with Varimax Rotation

Variable	Factors					
	1	2	3	4	5	6
1. Word Awareness Test I - Lists	0.69	0.16	0.23	0.13	0.05	0.13
2. Word Awareness Test II - Sentences	0.82	0.15	-0.07	0.19	0.17	0.29
3. Word Awareness Test III - Morphones	0.84	0.15	0.05	0.05	0.28	0.22
4. Simple Seriation	0.17	0.05	0.28	0.34	-0.09	0.59
5. Seriation with Screen	0.15	0.06	0.14	0.04	0.20	0.86
6. Seriation-Intercalation	0.28	0.24	0.63	-0.11	-0.15	0.25
7. Seriation of Monkeys	0.06	0.05	0.78	0.26	0.09	0.07
8. Seriation of Balloons	0.12	0.11	0.86	0.01	0.10	0.10
9. CAT - Oral Vocabulary	0.16	0.82	0.07	0.17	0.14	0.07
10. CAT - Relational Concepts	0.03	0.93	0.04	0.03	0.02	0.04
11. CAT - Multi-Mental	-0.05	0.88	0.07	-0.03	0.05	0.09
12. CAT - Quantitative Concepts	0.30	0.74	0.23	0.11	0.03	-0.02
13. Riddle Understanding - 1	0.27	0.27	0.16	0.14	0.69	-0.09
14. Riddle Understanding - 2	0.09	0.15	0.09	0.25	0.73	-0.04
15. Riddle Understanding - 3	0.10	-0.24	-0.10	0.01	0.50	0.12
16. Riddle Understanding - 4	0.21	0.18	-0.00	-0.16	0.63	0.41
17. Chronological age	0.70	-0.10	0.24	-0.07	0.17	-0.13
18. Mother's education	0.03	0.12	0.19	0.83	0.17	0.14
19. Father's education	0.14	0.07	-0.02	0.89	0.06	0.04

Table 6

Categorical Analysis of Total Scores on Word Awareness Tests[a] vs. Total Scores on Seriation Tasks[b]

Kindergarten Subsample (N = 50)

		Word Awareness Tests		
		Low	High	Total
Seriation	High	4	6	10
	Low	31	9	40
	Total	35	15	50

First Grade Subsample (N = 50)

		Word Awareness Tests		
		Low	High	Total
Seriation	High	1	15	16
	Low	5	29	34
	Total	6	44	50

Total Sample (N = 100)

		Word Awareness Tests		
		Low	High	Total
Seriation	High	5	21	26
	Low	36	38	74
	Total	41	59	100

[a] Maximum possible score on three Word Awareness Tests was 60. Cut-off made at 40 with a minimum score of 10 on Test III, Homophones.

[b] Maximum possible score on three Piagetian Seriation Tests was 30. Cut-off made at 27.